WASHINGTON WATER POWER COMPANY POST FALLS POWER PLANT
Exit 5 off of Interstate 90 (I-90) south on Spokane Street to Fourth Street, turn right and follow signs to public and restricted access to the power plant
on the Spokane River
Post Falls
Kootenai County
Idaho

HAER No. ID-32

HAER
ID
28-POFAL,
1-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Columbia Cascades System Support Office
National Park Service
909 First Avenue
Seattle, Washington 98104-1060

HAER
ID
28-POFAL,
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HISTORIC AMERICAN ENGINEERING RECORD
Washington Water Power Company Post Falls Power Plant

HAER No. ID-32

Location:	Spokane River, Post Falls, Idaho, approximately ½ mile west of intersection of Spokane and Fourth streets, City of Post Falls, Idaho U.S.G.S. 7.5 minute Post Falls, Idaho quadrangle,Universal Transverse Mercator coordinates: A 11.503480.512813950; B 11.503220.52840000; C 11.502620.5283760; D 11.503270.51283210.
Date of Construction:	1904-1906.
Engineer:	The Washington Water Power Company
Builder:	The Washington Water Power Company
Present Owner:	The Washington Water Power Company P.O. Box 3727 Spokane, Washington 99220
Present Use:	Hydroelectric production and electrical transmission
Significance:	The Washington Water Power Company Post Falls Power Plant is significant for the role it played in the early economic development of eastern Washington and northern Idaho, particularly in facilitating growth of derivative industries, most importantly mineral resource development. The Post Falls Power Plant also played an important role in town-building and rural electrification. As the eastern-most of the Washington Water Power Company's six hydroelectric developments on the Spokane River, the Post Falls Power Plant historically and currently serves as the main natural controlling reservoir (Lake Coeur d'Alene) for the entire Spokane River system. Its position on the Spokane River later helped the Washington Water Power Company gain control of all hydroelectric development on the Spokane River.
Report Prepared by:	Robin Bruce, Historian Western Historical Services 731 Dundee Drive Post Falls, Idaho 83854
Date:	March 1997

I. INTRODUCTION:

The Washington Water Power Company Post Falls Power Plant (hereafter the Post Falls Power Plant) is located in Sections, 3 and 4, Township 50 North, Range 5 West, Boise Meridian, on the Spokane River. The Post Falls Power Plant occupies land and waterways within the city limits of Post Falls, Kootenai County, Idaho. The historic property is located approximately (hereafter c.) nine miles downstream (west of) Lake Coeur d'Alene, which is the head of the Spokane River. That waterway flows c. 100 miles westerly to its confluence with the Columbia River in Washington state. The Post Falls Power Plant was the first hydroelectric facility constructed by The Washington Water Power Company (hereafter the WWP) outside of the city of Spokane, Washington, located c. 30 miles to the west. From the time of its construction (1904-1906), the Post Falls Power Plant has played a pivotal role in the development of the "Inland Empire Region" of the Pacific Northwest.

With the city of Spokane at its center, in the latter decade of the nineteenth century and the beginning decade of the twentieth century, the Inland Empire encompassed "a region reaching all the way from southern British Columbia to Oregon's Blue Mountains and from the Cascades to the Rockies."[1] Completion of the Post Falls Power Plant facilitated utilization of industries including lumbering, agriculture, and particularly mining within that vast area. The Post Falls Power Plant retains a high degree of integrity regarding engineering and architectural features, and intactness of original power generating equipment. It is among the least altered of the WWP's six hydroelectric developments on the Spokane River.

II. LAYOUT OF THE POST FALLS POWER PLANT:

The Spokane River historically (and presently) divides into three channels (the North, Middle, and South channels) at the site of the Post Falls Power Plant, a complex consisting of the Middle Channel power plant and dam, and the North and South channel dams. The configuration of the three channels and their attendant falls influenced the original form and design of the Post Falls Power Plant. The Middle and South channels form two adjacent islands in the river. The larger Middle Channel island lies directly north of the smaller South Channel island. The power plant and run-of-the-river dam are located along the southwest shore of the larger Middle Channel island. At that point, the power plant and dam span the Middle Channel to the smaller uninhabited island, where the South Channel dam crosses that waterway c. 0.3 mi. south of the power plant. The larger L-shaped

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[1]Donald W. Meinig, "Spokane and the Inland Empire: Historical Geographic Systems and a Sense of Place," *Spokane and the Inland Empire, An Interior Pacific Northwest Anthology*. Edited by David H Stratton (Pullman, Washington: Washington State University Press, 1991, p. 14.

North Channel dam functions as the main controlling works for Lake Coeur d'Alene, the natural holding reservoir for the WWP's entire Spokane River system. The North Channel dam is located c. 0.3 mi. east of the dam and power plant. The Middle Channel dam and power plant are accessed by two WWP-owned bridges (see *Figure 1*, "Sketch Plan of the Post Falls Power Plant," p. 32).

The Post Falls Power Plant occupies an area historically and presently of great natural beauty. The historic property is located near the western edge of the Northern Rocky Mountain Geologic Provence, where all three dams are founded on 600-million-year-old solid bedrock.[2] The North Channel spillway dam is especially imposing, especially during times of maximum river flow see photograph no's ID-32-B-3 through ID-32 B-4). The dam is clearly visible from both east- and west-bound traffic on Interstate Highway 90 (I-90), located less than 0.5 mi. north of the structure. The concrete arch bridge (described later in this report) serves as a lovely framework for the waters of the North Channel dam as the river there cascades through a constricted gorge composed of 60-80 ft. high jointed rock cliffs (see photograph no. ID-32 -1-B).[3] Especially during spring run-off, the thundering falls and attendant mist form a spectacular sight for pedestrian traffic, as well. Pedestrian trail systems pass directly by both the North and South channel dams and continue from there upstream and downstream along the Spokane River.

The seclusion of the two channel islands and lack of public access to those sites has maintained a remarkably pristine environment within an urban setting that has recently experienced rapid commercial and residential growth. Within a 35-mi. radius of the City of Post Falls, there is a current population of over 500,000 people, prompting former Idaho Governor Cecil Andrus to declare "Post Falls ... the Largest Little Town in Idaho."[4] Similarly, although urban and industrial development borders the North and South Channel dams, these structures, too, have retained their integrity of location, design, setting, feeling, and associations.

This is largely because both of those hydraulic control mechanisms lie within the confines of the municipal park system of the City of Post Falls. These include Q'emiln Park and Trails (formerly South City Park). The park covers ninety acres of recreational land and five miles of hiking trails. Portions of the park's trail system pass adjacent to (south of) the South Channel dam. Falls Park is situated across the Spokane River directly north of Q'emiln Park. Both parks are mainly located

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[2]Ebasco Services Incorporated, "Dam Stability Studies for the Post Falls Development of the Spokane River Hydroelectric Project," (1990), p. 2.2. From the WWP Hydro Power and Construction Archives, WWP, Spokane, Washington. File folder: "Generation: Post Falls: FERC: General:"

[3]Ebasco, "Dam Stability Studies for the Post Falls Development of the Spokane River Hydroelectric Project," (1990), p. 2.2.

[4]Post Falls Chamber of Commerce, "Post Falls Idaho's River City" (1994), n.p.

just upstream from where the Spokane River divides into the three channels that include the structures of the Post Falls Power Plant. Falls Park encompasses nineteen acres that was recently granted to the City of Post Falls by the WWP through a long-term lease agreement. The park features paved hiking trails and interpretive signs that "provide visitors with historical, geological, and biological information about the area."[5] It also includes several viewing promenades that furnish visitors with breathtaking views of the spillways of the North Channel dam and the precipitous downstream gorge that forms the riverine passage below. The Centennial Trail, a sixty-mile long interstate pedestrian trail system, also passes along and near the north shore of the Spokane River, affording exceptional views of riverine scenery along its route. The Centennial Trail commemorates the year that Idaho and Washington were admitted as states to the Union in 1889. These trail systems serve as buffers that protect the Post Falls Power Plant's historic associations from modern intrusions.

In many respects the site of the Post Falls Power Plant has maintained to a remarkable degree many of the physical and geographic features that first charmed early Euro-American visitors to the site more than 100 years ago:

> Spokane Prairie pierces the [Idaho] 'Pan-handle' some 20 miles, and in the midst of this expanse lies Post Falls, occupying a picturesque plateau as level as a floor, and girt with charming scenery. On three sides of the open prairie stretches for miles to distant wooded mountains,. Upon the south side of the town flows the swift Spokane River, lined with a variety of trees, and just across are the silver-studded hills and fertile valleys of the Coeur d'Alene [Indian] reservation.[6]

Since the year of its completion (1906), the Post Falls Power Plant has undergone minimal modifications. It remains among the least altered of the WWP's six hydroelectric power stations on the Spokane River. The Idaho State Historic Preservation Officer (SHPO) has determined the Post Falls Power Plant eligible for inclusion in the National Register of Historic Places (NRHP).[7]

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[5]WWP, Spokane River Corridor, Recreational Opportunities from Riverfront Park to Lake Coeur d'Alene," brochure published by the WWP, (1994), n.p.

[6]Northwestern Industrial Exposition, *The City of Spokane and its Tributary Resources* (Buffalo and New York: Matthews, Northrup & Co., Art-Printing Works, 1890). Reprint from the original edition (Spokane , Washington: Lawton Printing, Inc. (1973), p. 50.

[7]Federal Energy Regulatory Commission (FERC), "Application for Amendment of License . . . . of Spokane River Project No. 2545, as amended by order issued on 22 July 1981." Located in the Licensing and Environmental Department of the WWP, Spokane, Washington.

III. PRESENT PURPOSE AND FUNCTION OF THE POST FALLS POWER PLANT

The purpose and function of the Post Falls Power Plant and its configuration is basically unchanged since its construction dates (1904-1906) to the present. As the WWP's eastern-most hydroelectric development on the Spokane River, that facility has historically served, and continues to serve, as a dependable storage impoundment for Lake Coeur d'Alene, the main holding reservoir for the entire Spokane River system. Lake Coeur d'Alene covers an area of c. 45 square miles. At the time of construction of the Post Falls Power Plant, from Lake Coeur d'Alene to the Post Falls Power Plant, the Spokane River had a flow that measured between "40,000 sec. ft. and a natural minimum of 1500 sec.ft."[8] Presently, the reservoir covers an area of 48,000 acres, with a storage capacity of 225,00 acre-feet, and drains a mountainous area of c. 3,784 square miles.[9]

IV. TECHNOLOGICAL AND CONSTRUCTION HISTORY OF THE POST FALLS POWER PLANT:

Technologically, The Post Falls Power Plant functions as a gravity-flow hydraulic system, which utilizes a continuous stream of falling water that flows through the turbine units. In hydroelectric power stations, like the Post Falls Power Plant, the flowing water exerts a force against a series of "blades or buckets attached around a shaft, causing the shaft to rotate, this motion in turn being used to drive the rotor of [the] electric [generators]."[10] The six generators in the Post Falls Power Plant are alternating current (AC) units. At the time of their installation in the first decade of the twentieth century, they represented a major technological advancement over the direct current (DC) systems then almost exclusively in use nation-wide.

The power produced by the turbine-generator units pass from the generators through conduits in the bus works (not original) located in the present control room. The bus works lead from the control room to the transformer (not original) that is located adjacent to the southeast side of the power plant. The transformer steps-up the bus work voltage from 2,400 kva to 110,000 kva. From there transmission wires proceed to the modern substation located adjacent to (northeast and outside of) the "old switching building," where it is thence dispensed to various feeder lines within the Post Falls Power Plant system.[11]

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[8]C.F. Uhden, "System of Washington Water Power Company," 1915 reprint; San Francisco: Technical Publishing Company, (1915), p. 5.

[9]WWP, "Post Falls HED, FERC Project License No. 2545, March 1993," (1993) n.p. WWP, Engineering Archives, Spokane, Washington.

[10]*Concise Columbia Electronic Encyclopedia, s.v. "Turbine."*

[11]Lynn Crouse (WWP Journeyman Operator), interview with author, Post Falls Power Plant, 13 April 1996.

Before construction of the Post Falls Power Plant commenced in 1904, a temporary step-down station was erected to facilitate a 60,000-volt transmission tie-line between Post Falls and the Monroe Street power plant located on the lower falls in the heart of the City of Spokane. That conduit served as the source of energy to operate a "rock crusher, concrete mixers, cableways, eofferdam pumps," as well as to provide lighting for the various construction staging areas that comprised the separate components of the Post Falls Power Plant.[12]

During its construction (1904-1906), a Spokane-based newspaper, the *Spokesman-Review,* boasted that upon its completion the Post Falls Power Plant "will be one of the largest power plants in the west."[13] The same article declared that the North Channel dam "will have a bear trap gate 110 feet long, the largest trap of the kind ever built."[14] First patented in the U.S. in 1818, the design was so unlike hydraulic gates of the time that the first workmen constructing the peculiar mechanism discouraged curious onlookers by declaring that they were building a "bear-trap," 'a name the gate has borne ever since.'"[15]

The design as originally constructed consisted of two rectangular leaves equal in length to the width of the opening they covered. When the gates raiscd, the lower leaf lifted the upper leaf by "its edge sliding under it, the friction being reduced by rollers."[16] The bear-trap design underwent several improvements over the years, particularly during the 1880s. The Post Falls bear-trap gate is an example of later improvements, particularly in thc 1880s, when the design was promoted as "possibly the cheapest" for letting water rapidly out of large reservoirs.[17] At the time of its construction, improvements on the bear-trap design seemed particularly well-suited to conditions at the North Channel dam. Unfortunately, the design was not without its flaws, including warping and twisting during raising and lowering, thus damaging the gate. That design also typically produced less head than those experienced by other types of gates.[18] These problems were undoubtedly factors in the WWP's decision to replace the bear-trap gate with a rolling sector gate in 1922 (described in section **VIII** of this report).

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[12]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Washington," (1908), n.p.

[13]"Build Big Plant at Post Falls, *Spokesman-Review*, 1 October 1905, Part 2, p.1:4.

[14]Ibid.

[15]Edward Wegmann, *The Design and Construction of Dams including Masonry, Earth, Rock-Fill, Timber, and Steel Structures also the Principal Types of Movable Dams*. 7th ed. (New York: John Wiley and Sons, Inc., 1922), p. 344.

[16]Wegmann, (1922), p. 345.

[17]Wegmann, *The Design and Construction of Dams*. (1922), p. 344.

[18]Ibid., p. 345.

The Post Falls Power Plant is also an example of one of the nation's first hydroelectric systems to successfully transmit electrical power over long distances. In 1901, the WWP began construction of a long-distance transmission line, originating from its Monroe Street plant in Spokane, and terminating at the Coeur d'Alene Mining District in northern Idaho, a distance of c.100 mi. At the time of its completion it was the second longest transmission line in the U.S., and it transmitted the largest voltage (60,000 volts).[19]

In 1903 (the year the long-distance transmission line was completed), the WWP installed the first two (of eventually four) AC turbine-generator units in its Monroe Street plant. Installation of those units that year made the feat of completion of the transmission line to northern Idaho possible.[20] The Post Falls Power Plant soon became an important component and addition to the advancement of the WWP's long-distance transmission systems with its tie-in to the Spokane Falls line, and eventually with its own separate line to the Coeur d'Alene mines, a distance of more than 60 miles.

The WWP's pioneering efforts in the development and successful implementation of long-distance electrical transmission were made possible by the refinement of AC generating units. Until the first decade of the twentieth century, DC units produced most of the electrical power for consumption in the U.S. In principle, AC and DC generators operate conversely: "in direct-current generators the field is stationary and the conductors are moved, while in alternating current generators the conductors are stationary and the field is moved."[21] Besides the much smaller generating potential of DC units, the immense advantage in AC generating equipment is its ability to economically and easily transform voltage, via altemating-current, by means of a relatively simple and efficient device--the transformer.

The transformer allows low voltage AC current to be easily transferred from one circuit of voltage to another circuit of voltage on the same unit (stepping-up or stepping-down voltage as consumer needs and energy supply's dictate). There is no counterpart to the transformer in DC generating units. This means that DC current with its limitation of fixed (continuous) low voltage (rarely exceeding 750 volts), when transmitted over a "given length of line, the line loss varies inversely as the square of the transmission voltage," thus resulting in drastic line loss over long distances.[22] Conversely, in AC transmission, the opposite is true: the higher the voltage, the lower the line loss.

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[19]"D. L. Huntington Tells How Energy From Spokane Falls Will Be Carried 100 Miles," *Spokesman-Review*, Section B, p. 3:5.

[20]Robin Bruce and Craig Holstine, "Washington Water Power Company (WWP) Monroe Street Plant, Generating Units 4 and 5," Historic American Engineering Record (HAER No. WA-29), in the Archives of the Library of Congress, Washington, D.C. (1990), p. 11.

[21]E.A. Lowe, *Direct and Alternating Currents, (1933), pp. 133-134; 413.*

[22]Ibid., p. 272.

At the time of its construction, a series of falls on the three channels at Post Falls resulted in a head of c. 50 feet.[23] Construction of the Post Falls Power Plant commenced at that site beginning in 1904, with construction concluding there in late 1906. At that time, the Post Falls Power Plant consisted of the concrete with brick overlay power plant and gravity-flow, run-of-the-river dam and attached brick switching building, and a small detached "Blacksmith's Shop" (since removed) on the Middle Channel of the river, and the upstream North and South channel holding reservoir control dams (See Figure 1, "Sketch plan of the Post Falls Power Plant," p.32). The structures that originally comprised the Post Falls Power Plant will be described in succeeding sections of this report. The original purpose and design of the Post Falls Plant was primarily to serve as a backup unit for the WWP's Spokane power installations. It was intended to operate in tandem with the Spokane hydraulic and steam plants, and to furnish a controlling works "for the storage of water for use in the low-water seasons, while at the same time permitting a free passage of water during the season of flood water" along the Spokane River.[24]

The Annual Reports of The WWP to their shareholders in the years that preceded and followed construction of the Post Falls Power Plant are highly instructive concerning the changing nature and increasingly important role of the Post Falls Power Plant to the WWP's Spokane River system. The Annual Report of 1903, for instance, discusses the long-distance transmission line (more than 100 miles in length) from the WWP's Post Street Substation in Spokane to the Coeur d'Alene mines in northern Idaho:

> That such an important extension of our business was effected, necessitating the widening of dams, installing additional flumes, generators, underground conduits, a pole line over one hundred miles in length with adequate copper conductors, insulation, substation, stepdown transformers, etc., without the aid of outside consulting engineers speaks well of the efficiency of our own organization. The great machinery of the mines under contract for power swung into motion the instant the current was turned on and have moved steadily and reliably ever since. We believe no other line of this kind in the world has record equal to ours for efficiency at the start and for continued uninterrupted operation. We consider the long-distance transmission of power a promising addition to our business.[25]

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[23]C. S. MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash.," (1908 reprint; New York, *Electrical World*, May 23-30), n.p.

[24]Ibid.

[25]The Washington Water Power Company (WWP), "Annual Report of The Washington Water Power Co., Spokane, Washington," (1903), p. 5. WWP Archives, Multimedia Records Center, Spokane, Washington.

The succeeding year, in 1904, the urgency of development of an hydroelectric works at Post Falls was even more apparent, since it superseded development potential of the upper and lower falls of the Spokane River at Spokane where the WWP's main power plant then existed. This was largely because of a season of unprecedented low rainfall in the region (only 5.3" compared to an average rainfall of 18.08"):[26]

> [T]he recurrence of such a season by pushing the development of our power at Post Falls, which will be so arranged as to be available by transmission either at Spokane or at points nearer to Post Falls, and also enable us to control, to some extent the flow of the river at low water.[27]

In 1905, The Annual Report of the WWP complained of labor problems and inept contractors at the Post Falls Power Plant, while also maintaining a positive attitude regarding construction progress at the site:

> Our plant at Post Falls, delayed by a great scarcity of labor and by incompetent contractors, is not as near completion as we had reason to believe it would be at this time. The work is now being pushed forward under our own direction and we feel confident will be ready for service by July 1.[28]

The same annual report, however, revealed that the "dam in the South Channel is completed."[29] Similarly, the report assured that the "Middle and North Channels [dams were] so far advanced as to be protected against high water and severe water," while the power plant was "well-advanced" in its state of completion, with most of the electrical equipment ready for installation.[30]

The WWP's Annual Report for 1906 reiterated the importance of a duplicate line between the Spokane Monroe Street Substation and the Post Falls Power Plant for reliability. It also recognized

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[26]WWP, "Annual Report of The Washington Water Power Company for the Year Ending December 31st, 1904," p. 2. WWP Archives, Multimedia Records Center, Spokane, Washington.

[27]Ibid.

[28] WWP, "Annual Report of The Washington," (1905), p. 2. WWP Archives, Multimedia Records Center, Spokane, Washington.

[29]Ibid.

[30]Ibid.

the potential loads imposed by Coeur d'Alene mine expansion and the resultant effects on the WWP's Spokane River system:

> The duplicate transmission line between Post Falls and Spokane is completed, with the exception of a few unimportant items. . . . Surveys for a *duplicate* transmission line to the Coeur d'Alene mines have been completed, and the material provided, to commence construction as soon as the weather will permit in the spring. The line will be approximately 65 miles in length, connecting at Post Falls and running to a junction above Wallace, Idaho. Increasing business has so taxed our present line that the needs of a duplicate line are imperative, not only from an economical standpoint, but also to enable us to furnish a reliable service to our old customers and to supply power to new customers. The Coeur d'Alene district has never been so active and so prosperous as at the present time.[31]

No doubt, largely because of the very prosperity of the Coeur d'Alene mines, the WWP added a fifth turbine generator unit to the Post Falls Power Plant in 1908. The 2,250 kilowatt unit increased the capacity of the plant to 11,250 kilowatts (15,000 hp).[32]

V. DESCRIPTION AND FUNCTION OF THE MIDDLE CHANNEL ISLAND DAM AND POWER PLANT AND ITS SIGNIFICANT EQUIPMENT

The Middle Channel Dam is a concrete gravity, run-of-the-river dam that is integral with the power plant, forming one structure. The rated nameplate capacity of the Post Falls Power Plant is presently 14.75 MW.[33] The dam and power plant consists of a mass concrete substructure with a brick and masonry superstructure.[34] It rests on "concrete foundations over the tail-race and on original rock in the rest of the building."[35] It is shed-roofed in design, with a smaller open shed roof covering the

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[31]WWP, "Annual Report of The Washington Water Power Company for 1906," (1906), n.p.

[32]WWP, "Annual Report of The Washington Water Power Company for the Year Ending December 31, 1908," (1908), n.p.

[33]WWP, "Post Falls HED, FERC Project License No. 2545, March 1993," (1993), n.p. WWP Engineering Archives, Spokane, Washington.

[34]Ebasco Services Incorporated, "Inspection of Project Works, Post Falls Hydroelectric Development of the Spokane River Hydroelectric Project," (1989) p. II-2.

[35]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash.," (1908), n.d.

intake mechanisms. The dam/power plant stands 64 ft. high and is c. 85 ft. wide. The dam's crest measures 215 ft. in length, with the width of the crest measuring 14 ft. x 10 in. The upstream (southeast) side of the power plant forms the back wall for the six steel intake gates which control the flow of water through original corresponding penstocks that extend from the upstream face of the dam to the turbine-generator units situated on the floor of the power plant, and beneath to the sluiceway under the power plant (see photographs no.'s ID-32-A-13 through ID-32 -A-14; and ID-32-A-18; ID-32-A-20).[36]

The original electrically-powered trash rack cleaning mechanism, called "Jaws" by the present operators, the rails it passed over, and the original trash rake it drove has been removed (see photograph no's.ID-32-A-9 through ID-32-A-12) and replaced with a new hydraulic trash cleaning mechanism, new rails, and a new trash rack unit. The badly rusted rack unit was not an original feature. It was the last of several rack units that preceded the newly installed unit. Photograph no's.ID-32-A-9 through ID-32-A-11 show the trash rack unit before its recent removal. The former antiquated lifting system was deficient in its function of removing grasses and other debris that clog the trash racks which protect the six intake gates.[37] Because of its height, installation of the new hydraulic trash cleaning mechanism entailed removal of the original shed roof and supporting structure. (Photograph no. ID-32-A-9 and ID-A-32-11) shows the former shed roof.

The original six gate-lifting intake mechanisms retain their original position on the crest of the Middle Channel dam. The dam originally contained five headgates, each measuring c. 15 ft. in length and c. 14 ft. in width, with provision for a sixth gate of c. the same dimensions (see photograph no. ID-32-A-21). A sixth turbine-generator (Unit No. 6) was installed in that gate in 1980. Unit No. 6 is a General Electric, Type ATB, Form S unit, and it produces 2,300 volts of electricity.[38] The original vertical lift gates are of steel and timber construction (see photograph no. ID-32-A-20). One electric motor drives a single shaft that provides the power for the gear operating system for the six gates. Each gate, however, has its own hand-operated clutch so that each (or all) of the gates can also be manually controlled (see photograph no.ID-32-A-10). The gate-lifting mechanisms at the Post Falls Power Plant cannot be controlled electronically from the control room within the power plant, but must be manually operated at each respective gate-lifting station.[39] At the side of each gate is a feature called a filler gate. These small gates (c. 36 inches in diameter) are equipped with pipe

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[36]Ebasco, "Dam Stability Studies for the Post Falls Development of the Spokane River Hydroelectric Project," (1990), p. I-3.

[37]Lynn Crouse (WWP Journeyman Operator), interview with author, Post Falls Power Plant, 13 April 1996.

[38]WWP, "Post Falls HED FERC Project License No. 2545," (March 1993), n.p. From the WWP Engineering Archives, Spokane, Washington.

[39]Ibid.

connections to the main feeder gates. The feeder gates allow the run-of-the-river water to gradually fill the penstock before the main gate(s) are opened:

> The purpose of the filler gate is to facilitate the raising of the main headgate by filling the feeder pipe or penstock with water from the forebay, thus tending to equalize the hydraulic pressure on both sides of the headgate.[40]

The single-level turbine-generator room is 175 ft. long and is 61 ft.wide.[41] Originally this room formed an "L" at the end of the turbine-generator room, and "was laid out for six 2200-kv three-phase transformers" (since removed).[42] That space is now separated from the turbine-generator room by a dividing wall and serves as the control room for the Post Falls Power Plant.

Apparently the original function of the transformer room terminated in 1957 when replacement transformers were installed outside of the building. At that time the WWP's Assistant Superintendent for Maintenance and Construction corresponded with the company's Purchasing, Stores and General Services department regarding salvage of the five 650 kva transformers at Post Falls: "The rehabilitation of the Post Falls Power Plant will result in the five obsolete General Electric transformers to be sold as junk. These transformers are over fifty years old, and we have no further use for them on our system."[43]

The turbine-generator room houses five turbine-generator units that were installed during initial construction of the power plant, and a sixth unit that was added years later. The five original units are also equipped with the original exciters and governors. Turbine-generator bay number six of the Post Falls Power Plant is an original feature; however, the sixth turbine-generator unit was not installed until 1980.[44] Unit No. 6 was moved from another hydroelectric facility that was not a part of the WWP system. In 1908, C. S. MacCalla of the WWP, who directed the engineering staff and also supervised construction of the Post Falls Power Plant, provided a progress report regarding installation of the turbine-generator units:

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[40]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash.," (1908), n.p.

[41]Ibid.

[42]Ibid.

[43]R. C. Kelly, in correspondence to M. A. Riner, February 18, 1957. From the WWP's Hydro-Power and Construction Archives. File Drawer: Post Falls HED. File folder: "Generation: Post Falls: Equipment: General."

[44]H. E. LuBean, "Pertinent Post Falls Events," 1988, n.p.

> The first three generator and transformer units have been in operation since the summer of 1906. The fourth unit is now in service, and the fifth will be in operation early in the summer of 1908.[45] (see historic photograph no. ID-32-A-18).

At the time of installation of the five original turbine-generator units (1904-1908), "five plate steel penstocks (thimble for sixth is bulkheaded off and equipped with drain) 11'-3" in diameter x 53 feet long" supplied run-of-the-river water through the upstream side of the dam to the installed generating units[46]. The turbines, governors, generators, and exciters are described below:

> Turbines: No. 1, Double horizontal Francis turbine, manufactured by the I.P. Morris Company; no.'s 2-5, Double horizontal Francis turbines, rated hp 3,260, 138.5 rpm, hydraulic capacity of 850 CFS, manufactured by the Platt Iron Works.
>
> Governors: Five Type N Lombard governors, manufactured by the Lombard Governor Company, Ashland, Massachusetts.
>
> Generators: Five, Type ATB 3 phase, 60 cycle, 2300 volt, 1300 kva, 138 R.P.M., manufactured by the General Electric Company.
>
> Exciters: No. 1, type MP, 480 amps; no. 2, type MG 240 amps; no.'s 3, 4, and 5, Type MP-Form L, 480 amps, manufactured by the General Electric Company.

A description of the function of the generating equipment described above follows:

Turbines: Turbines are rotary engines that use a continuous flow of water that turns the shaft that drives the generators.[47]

Generators: The generators are the mechanisms that convert mechanical energy to electrical energy: They operate on the principle of electromagnetic [induction]. The generator moves a conductor

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[45]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash.," (1908), n.p.

[46]WWP, "Post Falls Station Engineering Data," (1960), p. 1. From the WWP Engineering Archives, Spokane, Washington. File Drawer: "Generation Post Falls: Equipment: Switchgear: Prints," file folder: "Generation" Post Falls: General: General."

[47]*Concise Columbia Electronic Encyclopedia*, s.v., "Turbine."

through a magnetic field and directs the current produced by the induced voltage to an external circuit.[48]

Governors: The Five original Type N Francis governors bring the turbine-generator units to synchronous speed, and function to maintain that speed (see historic photograph no. ID-32-A-14). In case of problems on the system, the governors can also close the gates to the turbines.[49]

Exciters: All AC generators require direct current for excitation. The function of the five original exciters at the Post Falls Power Plant is to supply electric current to produce the magnetic field in the generator units (see historic photograph no. ID-32-A-14).

Repairs and maintenance to the turbine-generator units are facilitated by original traveling cranes and their superstructures:

> A line of steel lattice columns extends across the room between the generators and water-wheels. These columns, besides supporting the roof trusses, carry one rail of each of the two Niles cranes--a 10-ton hand crane over the turbines and a 30-ton electric crane over the generators.[50] (see historic photograph no. ID-32-A-15).

Because of the entry system of the penstocks into the power plant each of the six turbine-generator units is entirely visible and accessible from all sides (see photograph no's ID-32-A-13 through ID-32-A-14). This configuration is unlike many gravity flow dams where the turbines are encased in turbine bays behind steel manhole coverings. The open turbine design at the Post Falls Power Plant, however, was not considered ideal at the time of installation:

> In order to install the quarter-turn leading to the turbine it was necessary to place the intake pipes [penstocks] rather closer to the extreme low-water level than ordinary practice would deem desirable.[51]

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[48]Ibid., "Generator."

[49]Crouse, interview with author, 13 April 1996.

[50]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash." (1908), n.p.

[51]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Washington," (1908), n.p.

However, the penstock design later proved its "efficacy" mainly because of the installation of baffle boards placed in front of each headgate.[52] The baffle boards prevented the "formation of whirlpools and the introduction of air into the feeder pipes."[53] The penstocks, turbine-generator units and their governors and exciters for units 1-5 are original and unaltered.

At the time of the Post Falls Power Plant's completion in 1906, a gallery at one end of the generator room, and located above the turbine-generator units, served as the controlling switchboard for the Post Falls Power Plant. The controlling switchboard was "arranged in the form of a combined bench and panel board of blue Vermont marble."[54] To and from the gallery passed the "electrical connections between generators, switchboard, transformers and the 60,000-volt switches and buses."[55] It is likely that the controlling switchboard and related equipment were dismantled and removed from the gallery about the same time that the five original transformers were removed from the L-shaped extension of the turbine-generator room (refer to text with footnote 43).

With the exception of the recent removal of the shed roof on the upriver (southeast) facade of the power plant, and removal of the trash cleaning mechanism, changes to the Middle Channel power plant and dam have been minimal. Removal of the shed roof and trash cleaning mechanism, however, does not appear to have compromised the historic integrity of the power plant regarding its eligibility for listing in the NRHP. Although much of the original equipment has been removed from the old switching building and it is no longer functional, its interior spaces remain unaltered, and it possesses excellent exterior integrity.

VI. ARCHITECTURAL AND ARTISTIC FEATURES OF THE MIDDLE CHANNEL POWER PLANT AND DAM

At the time of its construction, as it does presently, the structures that comprise the Post Falls Power Plant give the appearance of two detached structures: the power plant and dam and the building (now abandoned) currently referred to as the "old switching building" (See Photographs ID-32-A-3; ID-32-A-6 through ID-32-A-8). However, these structures originally were fully integrated by design to take advantage of the rugged topography, particularly the solid bedrock of the Middle Channel island and waterway:

> Before commencing the concreting, the foundation of granite bedrock was carefully cleaned and covered with a grouting of neat

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[52]Ibid.

[53]Ibid.

[54]Ibid.

[55]Ibid.

> cement. In freezing weather steam was used to thoroughly free the bedrock of frost and ice.
>
> The concrete was carried across in layers. The large boulders were left projecting above the surface of each layer to form a dowel for the layer next above. [56]

The most visible and imposing of these structures is the old switching building. It stands above and adjacent to (northwest of) the power plant. The flat-roofed structure measures c. 145 ft. in length and is c. 36 ft. wide. The three-story structure stands c. 65 ft. tall. The shed-roofed power plant is covered by a corbiestepped roofline on the downstream (northeast) side of the structure. A second, smaller, steel-framed shed roof (since removed) covered the gate- and trash-lifting mechanisms. That portion of the structure was not enclosed. The dam and power plant stand 64 ft. high and the structure is 85 ft. wide. Together, the Middle Channel dam, power plant and old switching building present a dramatic, fortress-like appearance along the northeastern shoreline of the Middle Channel island.

This effect is highlighted by the artistic and architectural stylistic treatments that embellish the structures. This is most evident in the crenelation that forms the upper decorative border of the old switching building. This artistic feature simulates the design of protective battlements. Brickwork of a contrasting (darker) hue forms a uniform and continuous line pattern, characterized by mock raised portions (merlons) and indentations (embrasures) that for centuries past served as protective architectural design features for defensive structures, but that have been common *motifs* in ceramic and textile arts as well (see photograph no.'s ID- 32-A-4; ID-32-A-7).[57] This effect is repeated in the battlemented parapet that caps the roofline for the length of the northwest facade of the power plant. Although the parapet appears to be somewhat modified from the original (see photograph no.'s ID-32-A-3; ID-32-A-6), the effect remains essentially unchanged. Centered below the embrasures on the northwest facade of the power plant are designs in the form of Greek crosses of contrasting brick of a darker hue. Other than the simple cement coping of the structure's roof, they are the only additional artistic embellishments.

Original fenestration in the power plant also stylistically unifies the various exterior elements of the structure. Numerous tall, narrow, multi-paned, wood-framed double-hung windows provide natural light and ventilation to the structure (see photograph no.'s ID-32-A-6 through ID- 32-A-8). Their only adornment is wooden arches placed above the windows and topped by flat keystones of vertical brick. In keeping with the industrial nature of the structure, the main wood-batten doorway entrances

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[56]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Washington," 1908), n.p.

[57]Ralph Mayer, *A Dictionary of Art Terms and Techniques.* (New York: Harper Perennial, 1981), p. 98.

are utilitarian in composition and function. The windows, in particular, appeared to have been an important design consideration at the time the power plant was constructed:

> Large windows are placed in the down-stream and end walls, as well as in the brick wall built on the top of the dam, giving a well-lighted room and providing excellent ventilation.[58]

The structures that comprise that Middle Channel island integrate to a remarkable degree manmade and natural features unusual for an industrial site. The rugged terrain of the island, its lack of modern intrusions, and towering ponderosa pine and other native shrubs and forbs, together with the configuration and architectural and artistic arrangement of the power plant's components, are mutually complementary, and aesthetically pleasing.

VII: WWP BRIDGES

Access to the Middle Channel Post Falls Power Plant is provided by two concrete bridges. Both structures have recently been nominated to the National Register of Historic Places (NRHP), and are pending review by the Idaho State Historic Preservation Officer.[59] The larger of the structures is a reinforced concrete arch bridge that was designed and constructed by the WWP in 1929 expressly to facilitate access to the power plant and dam across the North Channel to the Middle Channel island (see photograph no.'s ID-32-D-1 through ID-32-D-5). This graceful structure is described as consisting of:

> thirteen spans of seventeen feet, for a length of two hundred and twenty-one feet. Of this total, the eastern approach contains three spans, the arch eight spans, and the western approach two spans.[60]

The smaller second bridge, constructed c. 1930, was also designed and constructed by the WWP to span the irrigation canal of the Spokane Valley Irrigation Company (see photograph no.'s ID-32 -E-1 through ID-32 -E-5). The canal was constructed in the first decade of the twentieth century and the extant bridge apparently replaced an earlier wooden bridge that crossed that waterway (the canal is discussed in section **XI** of this report). The present bridge crosses the canal ca. .25 mi. north of

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[58]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Washington," (1908), n.p.

[59]Nancy Renk, "Washington Water Power Bridges," 1995 pending review by the Idaho State Historic Preservation Officer, 1995.

[60]Ibid., p.5.

where the Spokane River enters the North Channel dam. The irrigation canal bridge lies within Falls Park. Although available to pedestrian traffic, only the WWP (or those who have permission from the WWP) has vehicular access to the bridge since it is the sole means of approach to the concrete arch dam, with those two structures providing the only vehicular access to the Middle Channel island. This modest flat-span bridge is "sixteen feet wide and the bridge is sixty feet long, of which about forty-five feet is the actual span between the abutments."[61] Both structures have maintained good structural integrity.

VIII. THE NORTH CHANNEL DAM

The North Channel dam controls the main impoundment (Lake Coeur d'Alene) for the WWP's Spokane River system. Like the concrete arch bridge, (see description above), the spillway over the narrow North Channel dam is at all times noticeable, and particularly so, during peak spring run-off periods. Then the Spokane River cascades in a spectacular display of plunging water and foaming spray visible from passing motorists along the I-90 freeway and, if desired, more personally from several public pedestrian viewing promenades located adjacent to (north of) the North Channel Dam from Falls Park in the City of Post Falls.

The dam was designed by the WWP expressly to utilize the unique geology of the site. A recent (1993) description of the dam follows:

> The North Channel Dam is an "L" shaped structure constructed to take advantage of a steep rock bluff on the west side, and shallow rock outcropping on the east side of the stream channel. Downstream of the dam, flow is constricted in a steep, narrow gorge, consisting of 60 to 80 foot high, bare rock cliffs. The North Channel eventually sweeps to the west and joins the confluence of the other two channels approximately 4,500 feet downstream.[62]

Other entrepreneurs had earlier exploited the North Channel gorge to utilize the motive power of the Spokane River near the present North Channel dam. A description of one of the more ambitious of those developments follows:

> The current [present North Channel dam] concrete structure is directly downstream of a timber crib, rock-filled dam that was built in 1882 for

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[61] Ibid., p.4

[62] "Post Falls North Channel Foundation Flow Left Abutment Seepage Reduction Project," WWP Archives (Hydro-Power and Production), file drawer "Post Falls HED," File: "Generation: Post Falls: Dam: General," n.a., n.p., March 1993.

> use by a neighboring lumber mill; the now-submerged timber crib dam extends to the west bank at approximately a 7 [degree] angle, from the right (east) abutment of the sector gate portion of the current dam.[63]

The North Channel dam's appearance is important not only for its impressive looks, but mainly for its seminal function as the principal controlling works of the impoundment for the Post Falls Power Plant.[64] The structure's crest measures c. 430 ft. in length, and it is c. 31 ft. high. The largest section of the dam features an 100 ft. rolling sector gate, with a series of eight tainter gates located along the wing (northerly facing) portion of the dam.[65]

The rolling sector gate appears to be an improvement on variations of the original bear-trap gate. L.H. Cooley designed the first gate of this type, and the first two large sector gates (each 100 ft. long and 16 ft. high) were placed on the crest of the dam over the Genesee River near Rochester, New York in 1918.[66] The movable part of the sector gate is the feature that represents the greatest improvement over the bear-trap design (see photograph no. ID-32-B-5). Instead of the bear-trap design of overlapping leaf gates, the movable part of the sector gate is in the form of a cylinder (the rolling sector). The advantages of this design follow:

> The whole structure is hinged at what would be the center of the cylinder, thus allowing the gate to move up and down on the required arc. Angle irons, placed on the deck plate, act as skids for ice or debris that may pass over the dam . . . . The sector-gates are operated by varying the height of the water in the chamber under the gate. The water for this purpose is obtained from an intake, placed up-stream of the dam, and is conveyed to the gate chamber through a pipe, having suitable gate valves.[67]

The eight original tainter gates at the Post Falls Power Plant are another type of sector gate: "It differs from the sector-gate . . . in being raised above the water, when the dam is to be opened."[68] C. S. MacCalla, construction engineer in charge of the installation of the tainter gates at the time of their construction, described the project thus:

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[63]Ibid.

[64]MacCalla, 1908, n.p.

[65]"Post Falls North Channel Foundation Flow Left Abutment Seepage Reduction Project, 1993.

[66]Wegmann, *The Design and Construction of Dams*, (1922), pp. 416a-416b.

[67]Wegmann, *The Design and Construction of Dams*, 1922, p. 416b.

[68]Ibid.

> The Tainter gates are constructed of Puget Sound fir, with cast-iron hinges fitted to steel hinge beams of I-beam construction embedded in concrete piers. The hinge beams are anchored with long steel rods and anchor castings distributing the pressure to the base of the piers by a concrete cylinder weighting 4.8 tons, and is easily operated by one man by means of a worm-gear mechanism carried on I-beams placed across the sluiceway on the top of the piers.[69]

The North Channel dam has experienced only one major alteration since its construction; that, of course, being the replacement in 1922 of the original bear-trap gate (described in section **IV** of this report) with the present rolling (cylinder) gate. The sector gate is historic and represents the importance of employing advanced technology for the effective operation of functioning industrial facilities.

IX. THE SOUTH CHANNEL DAM

The South Channel dam is essentially a backup unit for the larger North Channel dam. It spans the South Channel of the Spokane River to the south uninhabited island. The dam is visible and accessible to pedestrian traffic from Q'emiln Park, (Exit 5 off the I-90 freeway, south on Spokane Street, across the Spokane Street bridge, and right on Parkway which dead-ends at Q'emiln Park). There historic foot trails pass adjacent to (south of the dam). The South Channel Dam is a simple concrete gravity-flow structure (see photograph no. ID-32-C-6). It measures 78 ft. in length. It is equipped with six original gates, each measuring 6 ft. wide and 13 ft. high of sliding pattern design (see photograph no.'s ID-32-C-1 through ID-32-C-2). The spillway is 42 ft. long (see photograph no. ID-32-C-3.) . The South Channel Dam is nearly original, except for the replacement of the authentic "hand-operated [gate-lifting] mechanism mounted on a car running on tracks placed on the top of the dam" (see photograph no.'s ID-32-C-4 through ID-32-C-5)."[70] At the time of its construction, it was deemed that a simple gate-operating system would suffice, since the "gates would usually be operated only once a year."[71] However, in intervening years, an electrically equipped gate-lifting mechanism has overall proved more suitable for conditions at the South Channel dam.

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[69]MacCalla, "The Post Falls Development of the Washington Water Power Company, Spokane, Wash.," (1908), n.p.

[70]Ibid.

[71]Ibid.

X. ETHNOGRAPHIC AND HISTORIC INFORMATION

The area that presently encompasses the Post Falls Power Plant was originally the homelands of the Coeur d'Alene Tribe of Indians. Before Euro-American contact in the early decades of the 1800s, those lands encompassed the following geographic area:

> . . . . they extended westward from the Coeur d'Alene and Bitterroot mountains to the headwaters of the Spokane River extending a short distance above Spokane Falls to Coeur d'Alene lake and all of the tributaries leading into the lake. To the southeast their boundaries extended across the headwaters of the Clearwater river. Westward their territory took in the Hangman Creek, DeSmet, and Farmington areas. It included the Spokane Valley and south of the Spokane river.[72]

According to some sources, the Coeur d'Alene Indian Tribe was composed of four separate bands, spread over a large geographic area. The main headquarters of those four groups was located in what is now the City of Coeur d'Alene, where the Coeur d'Alene River becomes the Spokane River. A second camp was located in the Spokane Valley near Saltese Lake (now dry); that site is located c. 2 mi. west of Liberty Lake, in Washington state. A third band was centered along the Coeur d'Alene River near the present site of the Old Cataldo Mission. The fourth band lived along the St. Joseph River, with their principal site located on a point of land where the St. Joseph River enters Coeur d'Alene Lake.[73] However, according to current members of the Coeur d'Alene Indian Tribe, a fifth band of Coeur d'Alene peoples lived near the present city of Colfax, Washington.[74]

In his seminal work, "Native American Groupings of the Columbia Basin," published by ethnologist Verne Ray in 1936, Ray gathered village locational information directly from Native American informants. His methodology follows:

> Informants were selected so that the information was furnished from direct experience or from knowledge gained from parents or others of the same generation. Many of the villages here named and located were

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[72]Jerome Peltier, *A Brief History of the Coeur D'Alene Indians 1805-1909*, (Fairfield, Washington: *Ye Galleon Press*, 1982), p. 17.

[73]Ibid.

[74]Henry SiJohn of the Coeur d'Alene Tribe of Indians, interview with Charlene Abrahamson of WWP, July 1996.

> birth places of residences of informants themselves or were visited by them during youth.[75]

One of the villages identified by Ray's research was near or at the site of the present South Channel dam. This small camp, numbering c. 15 people was named q'ami-lin, meaning "water falling into a mouth [pothole])."[76] Present Q'emiln Riverside Park that borders the Post Falls Power Plant to the south is named in honor of that camp.

In c. 1805, members of the Lewis and Clark expedition are believed to have been the first Euro-Americans to have made contact with the Coeur d'Alene Tribe of Indians.[77] This was quickly surpassed by contact with Euro-American fur trappers and traders. In 1810, Spokane House, a fur-trapping and -trading depot was established by Jacques Finlay, under the auspices of David Thompson of the North West Company. Spokane House was located on the Spokane River, west of the present city of Spokane, and near the confluence of the Spokane and Little Spokane rivers. Two years later a fur-trading rival, the Pacific Fur Company, established Fort Spokane which was located within sight of Spokane House. In 1814, the North West Company gained control of Fort Spokane and moved their operation to the 1812 establishment (Fort Spokane). The North West Company then abandoned Spokane House.[78] Today the Spokane House Interpretive Center marks the location and remnants of those early fur-trading enterprises. The historic site is a part of Riverside State Park and is managed by the Washington State Park system.

Until Fort Spokane's abandonment in 1826 that facility changed the life-ways of both the Coeur d'Alene and Spokane Tribe of Indians who were influenced, as were other Native American groups in the West, by the fur-trapping and -trading industry. While it is not within the scope of this project to provide an exhaustive statement regarding that industry and its manifold consequences on Indian peoples, commerce, exploration, and later Euro-American emigration into the Trans-Mississippi West, an excellent source for a comprehensive and scholarly analysis of the subject is Hirman Martin Chittenden's classic two-volume work, *The American Fur Trade of the Far West*, first printed in 1935.

In the 1840s, Catholic missionaries of the Jesuit Order established themselves in the homelands of the Coeur d'Alene people. They introduced Christianity and Euro-American life ways to that tribe of

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[75]Verne F. Ray, "Native Villages and Groupings of the Columbia Basin," *The Pacific Northwest Quarterly*, vol. 27, (1936), p. 99.

[76]Ibid., p. 132.

[77]Ibid., p. 11.

[78]Louis R. Caywood, "Excavations at Fort Spokane 1950," *Northwest Discovery*, vol. 2, no. 1 (January 1950):5.

native people. By the early 1850s, the Coeur d'Alene people had largely embraced both Christianity and agricultural husbandry promoted by the Jesuit missionaries. The center of Jesuit activity radiated from what is now known as Cataldo Mission of the Sacred Heart near the Coeur d'Alene River. The mission is located c. 35 mi. east of present-day Post Falls, Idaho. Completed in 1853, it is "the oldest building standing in Idaho (finished seven years before the first permanent non-Indian settlement in the state), and it is one of Idaho's eight Registered National Landmarks."[79] This early missionary activity among the Coeur d'Alene Indian Tribe foreshadowed an event, which according to tribal members today, was perhaps the incident that most changed the life ways of the Coeur d'Alene Tribe. That event occurred following Ulysses S. Grant's election to the Presidency of the U.S. in 1868. Grant then mandated a type of peace resolution which financed the Christianization of all American Indians. Grant believed this act would halt hostilities and wars between Native American Indians and Whites.[80] The result of this mandate profoundly affected both Native American cultural practices and spiritual beliefs, since the intent of the act was to encourage Indian peoples to abandon their age-old life ways and to instead acculturate themselves to the radically different Euro-American value system.

Further Euro-American encroachment on Coeur d'Alene lands quickly ensued. Access to those lands was particularly enhanced by the completion of the Mullan Military Road in 1862. Conducted under the command of twenty-three-year-old Captain John Mullan, the 624-mile-road connected the heads' of navigation of two major waterways in the Inland Pacific Northwest. Those rivers were the Columbia and Missouri rivers from Wallula Junction on the Columbia (now a part of Washington State) to Fort Benton on the Missouri (now a part of Montana State). First Survey maps conducted by the General Land Office (GLO) in 1881 show that route, with a telegraph line running adjacent to (north of) the Mullan Road, passing directly north of the present Post Falls Power Plant. The same map also shows a "sawmill" located in the vicinity of the present North Channel Dam.[81] From Post Falls, the now famous road proceeded northeasterly through a major portion of Coeur d'Alene tribal lands and beyond before reaching its terminus at Fort Benton.

While little utilized for its original purpose, completion of the Mullan Road proved of lasting consequence to the development of the Inland Empire. It opened the region to thousands of settlers who first began moving into what is now eastern Washington and northern Idaho in the 1870s, and who began flocking to the region in the decades of the 1880s.[82]

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[79]Cort Conley, *Idaho for the Curious, A Guide*, (Cambridge, Idaho: Backeddy Books, 1982), p. 453.

[80]Henry StJohn, interview of July 1996.

[81]Bureau of Land Management (BLM), Coeur d'Alene, Idaho. Microfilm of Sections 3 and 4, Township 50 North, Range 5 West, Boise Meridian.

[82]Louis C. Clemen and Leo Rieman, *Captain John Mullan; His Life Building the Mullan Road; As It is Today and Interesting Tales of Occurrences Along the Road* from materials compiled by B. C. Payette. (Published privately

One of the earliest Euro-American emigrants to arrive in what is now the City of Post Falls was Frederick Post. In 1871, He arrived in what later became the city that today bears his name. A gristmill and sawmill builder by trade, Post, originally from Herbern, Prussia, soon realized the potential of the falls that later too bore his name. He also immediately befriended Chief Andrew Seltice of the Coeur d'Alene Tribe of Indians and tried to gain control of the land near what was then known as the Little Spokane Falls:[83]

> According to local legend, Post negotiated a treaty with Chief Seltice for the land which is now Post Falls and this agreement was recorded on the face of a rock, now known as Treaty Rock. Local historians agree that the Indian pictographs on the rock are authentic, but were probably painted in the 1700s.
>
> There is no conclusive evidence that the words, 'June 1, 1871 Frederick Post,' which were chiseled above the pictographs were intended to be a treaty between Chief Seltice and Frederick Post. It is not known exactly when or why the words were carved into the rock. However, when the treaty between the Coeur d'Alenes and the U.S. Government was drafted in 1889, Chief Seltice signed an article of agreement with the government that transferred the mill site and town site land to Frederick Post. This agreement became part of the treaty and was ratified by Congress in 1891.[84]

Now a park within the City of Post Falls, a number of foot trails lead visitors to the locally famous rock. Treaty Rock Park is located adjacent to (north of) the I-90 freeway, and is situated c. .5 mi. north of the present Post Falls Power Plant.

Shortly after Post's arrival in what was then Washington Territory, James N. Glover of Spokan, at that time the village's name was used interchangeably with Spokane Falls (the name was later shortened to Spokane), approached Frederick Post in an attempt to entice him to the new village located along the lower (main) and middle falls of the Spokane River. According to Glover, Post "was the most sought-for man of the entire region for years," when it was learned that he had brought with him to Post Falls a largely intact flour mill.[85] Since at that time (early 1870s), there were practically no significant flouring mills north of the Snake River, Post's mill and his ability to build

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[83]Robert Singletary, *Kootenai County Chronicles, A History of North Idaho*, vol. 1 of 2, (Coeur d'Alene, Idaho: Museum of North Idaho (1995), p. 7.

[84]Ibid.

[85]James N. Glover, *Reminiscences of James N. Glover*; (Fairfield, Washington: *Ye Galleon Press*, 1985), p. 59.

and operate it were in high demand.[86] Glover and the fledgling city of Spokane won out by offering Post this inducement: "I gave Mr. Post 40 acres west of Post street. The south line was Main avenue, and it extended across the river."[87] Post finished the mill in 1877, which was "in the block where the big power of the Washington Water [P]ower Company [later known as the Monroe Street Substation] now stands."[88] In the early 1880s, Post departed Spokane with his family and returned to Post Falls, where in Glover's words, Frederick Post "never would have been happy anywhere else."[89]

Other events of the 1880s soon made Frederick Post's water power at Post Falls and the motive power of the upper and lower falls located in the heart of Spokane extremely valuable properties. In 1883 the first trans-continental railroad to cross the nortbern-tier of the U.S., the Northern Pacific (NP), was completed from the Great Lakes to Puget Sound. The NP's route passed near Post Falls through the town of Rathdrum, Idaho, located c.7 mi. to the north, and from there proceeded west through the City of Spokane. As one scholar has commented: "Up to 1886 . . . Spokane was just another small town on the Northern Pacific line, in no better or worse position than hundreds of other towns similarly situated."[90]

However, that status changed with the discovery of placer gold in the Coeur d'Alene Mountain district of the Bitterroot Range in 1883, and was quickly followed by discovery of immense silver deposits at what is now Burke, Kellogg, and Wallace, Idaho, beginning in 1884. This long-lived mining district is today known as the Silver Valley. For years after initial discovery, hopes of capitalizing on this mineral wealth brought hordes of miners into the region. Most miners traveled via the NP to convenient jumping-off points to the mines, which included Spokane and Rathdrum. In 1886, Daniel Chase Corbin, an easterner, incorporated the Coeur d'Alene Railway Company that connected the NP with the heart of Coeur d'Alene Mines. Later this venture merged into the Spokane Falls and Idaho Railroad. Spokane benefitted the most from Corbin's efforts:

> The office and headquarters of the Spokane Falls and Idaho Railroad were located in Spokane and all trains ran into the city, except ore cars, which turned east at Hauser Junction. This arrangement channelled (*sic*) traffic to the Coeur d'Alene district in and out of Spokane, thus

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[86]Ibid.

[87]Ibid., p. 63.

[88]Ibid, p. 65.

[89]Ibid.

[90]Kensel, William Hudson Kensel, "The Economic History of Spokane, Washington, 1881-1910," (Doctor of Philosophy thesis, Washington State University, 1962), p. 49.

> giving the city an advantage over its competitors, such as Rathdrum, in the bid for the mining trade.[91]

With Spokane at the center, other railroad development quickly ensued. By 1890 four trans-continental railroads had reached Spokane: The NP, the Union Pacific, the Great Northern (Manitoba), and the Canadian Pacific, via the Spokane and Northern, as well as several branch railroads. Early Spokane boosters boasted of the advantages of their city as a railroad center, of the abundance of natural resources in the surrounding area, and of Spokane's isolation from any other significant competing railway center:

> [T]his is unquestionably the greatest inland railroad center on the Pacific slope. With our vast water-power and facilities for transportation, and with a variety of raw materials, this must become a great center of productive industries.
>
> Situated as we are 400 miles from any competing point, this is bound to be a great commercial center.[92]

The rise in population figures, particularly in the decade of the 1880s, clearly confirmed the confidence felt by Spokane businessmen in the importance of Spokane as an emerging commercial and transportation center: in just four years, beginning in 1885 through 1889, the population of the city escalated from 3,000 to 25,000 inhabitants.[93] In addition, commercial development, especially along the falls of the Spokane River, increased dramatically. In 1889, for example, Spokane Falls had nine large sawmills and three flour mills.[94] Most significantly, riverine development around the falls included the introduction of hydroelectric power production and transmission. By 1886, the City of Spokane had two rudimentary generating systems.[95] That same year a group of local businessmen bought the smaller of the two enterprises. They formed the Spokane Falls Electric Light and Power Company and ordered an Edison Electric Lighting Plant. Located on the north bank of the Spokane River, this system represented an improvement over the earlier enterprises.[96] However, it quickly

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[91]Ibid., pp. 50-51.

[92]Northwestern Industrial Exposition, *The City of Spokane and its Tributary Resources.*, p. 7.

[93]N. W. Durham, *History of the City of Spokane and Spokane Country Washington From Its Earliest Settlement to the Present Time,* vol. 1, (Spokane-Chicago-Philadelphia: The S. J. Clarke Publishing Company, 1912), p. 422.

[94]Ibid., pp. 424-425.

[95]Steve Blewett, *A History of the Washington Water Power Company 1889 to 1989,* (Spokane, Washington: The Washington Water Power Company, 1989), p. 3.

[96]Ibid., pp. 3-4.

became apparent that the new plant could not keep up with growing consumer demand. Those simple installations basically worked on the same principle:

> Up to [that] point power development had been limited to small installations fed by flume or built out where the water wheel could be dropped into the current above the lower falls of the river.[97]

This technology changed in 1889 in what was to be a momentous year not only for water power development in Spokane, but for Spokane itself, and for neighboring Post Falls, Idaho. First, a group of affluent citizens, in an attempt to fund the development of the lower (main) falls in Spokane, formed The Washington Water Power Company, and drew up Articles of Incorporation on March 13, 1889. These ambitious men planned to construct the largest state-of-the-art generating power plant in the City of Spokane.[98] However, less than five months after the WWP's incorporation, on August 4, 1889, the blaze which became known as the "great fire" consumed thirty-two blocks of the city, an area mainly confined to industrial and commercial buildings and structures near the upper and lower falls in the heart of the city--the district of greatest pride to the citizens of Spokane. According to one early account, in the aftermath of the fire and its destruction to those once myriad and impressive properties, "No vestige of their former grandeur remain[ed], save the blackened walls and smoldering wrecks in basements."[99]

Despite this catastrophe, Spokane quickly rebuilt, with the WWP spending $125,000 on clearing debris and rebuilding on their diverse land holdings in the burned area. They also continued construction work on their new power plant.[100] Because of the added electrical power requirements demanded by the fire's devastation, and the subsequent rebuilding effort that blaze entailed, the WWP decided to hasten development of the lower falls, and to install 1,100 kw of capacity, an output which more than doubled production of any power plants then operated by other competitors on the river.[101] This later proved to be a propitious decision.

A third event also occurred in 1889, one which affected the WWP's ability to tap the great water resources at Post Falls. That year "by treaty with the Coeur d'Alene tribe, 220,000 acres of the reservation were surrendered to the government."[102] Cession of this territory included Post Falls and

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[97]Ibid., p. 4.

[98]Ibid., p. 7.

[99]Durham, *History of the City of Spokane and Spokane Country Washington*, (1912), pp. 415-416.

[100]Ibid., p. 426.

[101]Blewett, *A History of the Washington Water Power Company*, (1989), p. 8.

[102]Northwestern Industrial Exposition, *The City of Spokane and its Tributary Resources, (1890), p. 50.*

the nearby town of Coeur d'Alene. As a result of the treaty, the town site of Post Falls and the mill site passed to Frederick Post (see footnote 84).

XI. THE POST FALLS POWER PLANT AND EXPANSION OF THE WWP SYSTEM

By 1890, industries around the series of falls at Post Falls included two saw mills, six shingle mills, one sash and door factory (then under construction), one flour mill, and one woolen mill (also then under construction). One early observer described the water power and the generating facilities that made such development possible:

> The water power at Post Falls is identical with that of Spokane Falls. The same volume passes both places. No tributary enters the river between, which is divided at Post Falls by islands into three channels. Each channel is held by a massive dam. The main current has a direct plunge of 42 feet a race of 1,700 feet long taps the river above the north dam and multiplies the natural facilities.[103]

Although the WWP already had a long-distance transmission line from Spokane to the Silver Valley, they were not the only entity interested in developing the power site at Post Falls. Mining entrepreneurs in the rich Coeur d'Alene mining district obviously held a strong vested interest in the water power potential of Post Falls. In the early 1890s, a group of miners purchased the Post Falls power site with the intention of developing its motive power to supply electricity to the Silver Valley.

However, by 1891, the WWP had completely eclipsed all other power generating enterprises on the Spokane River. That year they reported to their shareholders the success of their acquisitions:

> In other words the whole of the stock of the Spokane Street Railway Company, the Spokane Cable Railway Company, the Falls City Land and Improvement Company, and the Edison Electric Illuminating Company is either held in the name of the Washington Water Power Company, or held under a bond ready for transference. [104]

No doubt because of the WWP's experience in the business of power production, and their hydroelectric power and transmission assets, by 1901, the miners who then owned the Post Falls Power Plant, and who were apparently not prepared to embark on all that power development and

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[103]Ibid.

[104]WWP, "Annual Report of The Washington Water Power Company, Spokane, Washington," (1891), p. 4. WWP Multimedia Records Center, Spokane, Washington.

long-distance transmission to the mines would entail, began negotiations with the WWP to sell the Post Falls water power. They subsequently sold the site to the WWP before 1904.[105]

Completion of the North Channel Dam allowed the Spokane Valley Irrigation Company to construct a gravity flow irrigation ditch, which flowed from the impoundment behind the dam westward c. 30 mi. through the Spokane Valley to the city limits of Spokane. Early boosters of the irrigation ditch pointed to the "vast wealth which this city [Spokane] will acquire when 10 acre tracts are supporting a family and leaving a surplus for shipment."[106] (The present flat-span bridge described in section **VII** of this report crosses a portion of the abandoned ditch). Following completion of the Post Falls Power Plant in 1906, work immediately commenced on construction of the long-distance line to the Coeur d'Alene mines. The 1907 annual report to WWP shareholders reported on the progress and importance of the line:

> The duplicate line to the Coeur d'Alenes from Post Falls through the Fourth of July Canyon is completed to Cataldo, Idaho, a distance of 38 miles, and is connected with the existing line at that point, leaving 21.7 miles to be completed to Wallace. The distance by this route from Post Falls is thirty-five miles shorter than from Spokane to the Coeur d'Alenes by the old line, and it has twice the capacity of the old line, thus ensuring economy in transmission and continuity and excellence of service.[107]

This service obviously reflected itself in the output of the Coeur d'Alene mining district and in the revenues it produced not only for the WWP, but also for the region. In 1908, in data compiled by the Spokane Chamber of Commerce, mineral production produced revenues of $40,000,000, nearly twice as much as that generated by wheat production (the second largest commodity producer), and many more times the revenue produced by lumbering, livestock production, orchardry, and other miscellaneous agricultural commodities.[108] As the WWP's annual report of that same year (1908) reveals, rural electrification also held major importance in the mission of the WWP. Long-distance transmission lines in Washington that year extended to Davenport, c. 45 mi. west of Spokane, to

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[105]WWP, "Washington Water Power Company," report published by the WWP, n.d., n.p. In the Archives of the WWP, Spokane, Washington, file no. 7C1/6.11.

[106]*Spokesman-Review*, 8 October 1905, p.8:1.

[107]WWP, "Annual Report of The Washington Water Power Company, For Year Ending December 31, 1907," (1907), n.p.

[108]Durham, *History of City of Spokane and Spokane Country and Spokane Country Washington*, (1912), pp. 547-548.

Reardan, Ritzville, Paha, Harrington, and as far as Lind, located over 100 mi. from Spokane.[109] Rural electrification, both in promoting town-building and in supplying electricity to the rich agricultural areas south and east of Spokane, continued to be a major goal of the WWP.

During the first decade of the twentieth century, the WWP embarked on a remarkable series of hydroelectric developments on the Spokane River, which included early ambitious irrigation development made possible by the construction of the Post Falls Power Plant. In 1905 the Spokane Valley Irrigation Company had already begun work on a gravity-flow irrigation ditch which upon completion led from the impoundment of the Post Falls Power Plant reservoir c. 30 mi. west into the heart of the Spokane Valley. Before its long-distance transmission line had been completed, the WWP had begun construction of a power plant at Little Falls, located c. 30 mi. west of Spokane.

The Little Falls hydroelectric facility was completed in 1910. The four turbine-generator units at Little Falls produced a maximum of 11,250 hp each. Meanwhile, work was already underway on what was to become the largest and most sophisticated of the WWP's hydroelectric facilities on the Spokane River--the Long Lake development. At the time of its completion in 1915, Long Lake was the "highest spillway dam in existence."[110] The original installed capacity at Long Lake was 25,000 kw, which increased the WWP's generating capacity by half.[111] Finally, in 1925, the WWP reached an agreement with the Spokane and Inland Empire Railway and Power Company to purchase the Nine Mile hydroelectric facility, the only power plant on the Spokane River not controlled by the WWP. This purchase solidified the WWP's control of the entire hydroelectric development on the Spokane River, and Nine Mile's 12,000 kilowatt installed capacity increased the WWP's power generating plants to 139,750 kilowatts.[112]

With access to this vast measure of hydroelectric generating power, the WWP assumed an early and leading role in their goal of town-building and of rural electrification. Because of the scale of the WWP's resources and the efficiency of their Spokane River system, individual consumers, manufacturers, cities, and farms benefitted from nominal rates and dependable service. By 1929, the WWP had more than 10,000 rural customers and nearly 1,500 mi. of long-distance transmission lines throughout the region of eastern Washington and northern Idaho. At that time 61% of farms served by the WWP had electricity, making Washington second only to California in the nation as having the highest percentage of farms with electric service.[113]

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[109]WWP, "Annual Report," (1908), n.p.

[110]Uhden, "System of Washington Water Power Company, (1915), p. 10.

[111]Blewett, *A History of the Washington Water Power Company*, (1989), p. 24.

[112]Robin Bruce and Charles Luttrell, "Historic American Engineering Record Nine Mile Hydroelectric Development," (in the archives of the Library of Congress, Washington, D.C., 1989), p. 27.

[113]WWP, "Washington Water Power Company," n.p.

To conclude, as the source of the WWP's main holding reservoir on its Spokane River system, the Post Falls Power Plant occupied a principal role in subsequent hydroelectric development of that network, and today is a still a mainstay of the system. As this report illustrates, many of the benefits of the Post Falls Power Plant and its subsequent influence on further hydroelectric development on the Spokane River are quantifiable, others are not. Widespread availability of hydroelectricity led to changed technologies, altered landscapes, and transformed lifestyles in ways that are not as yet fully understood.

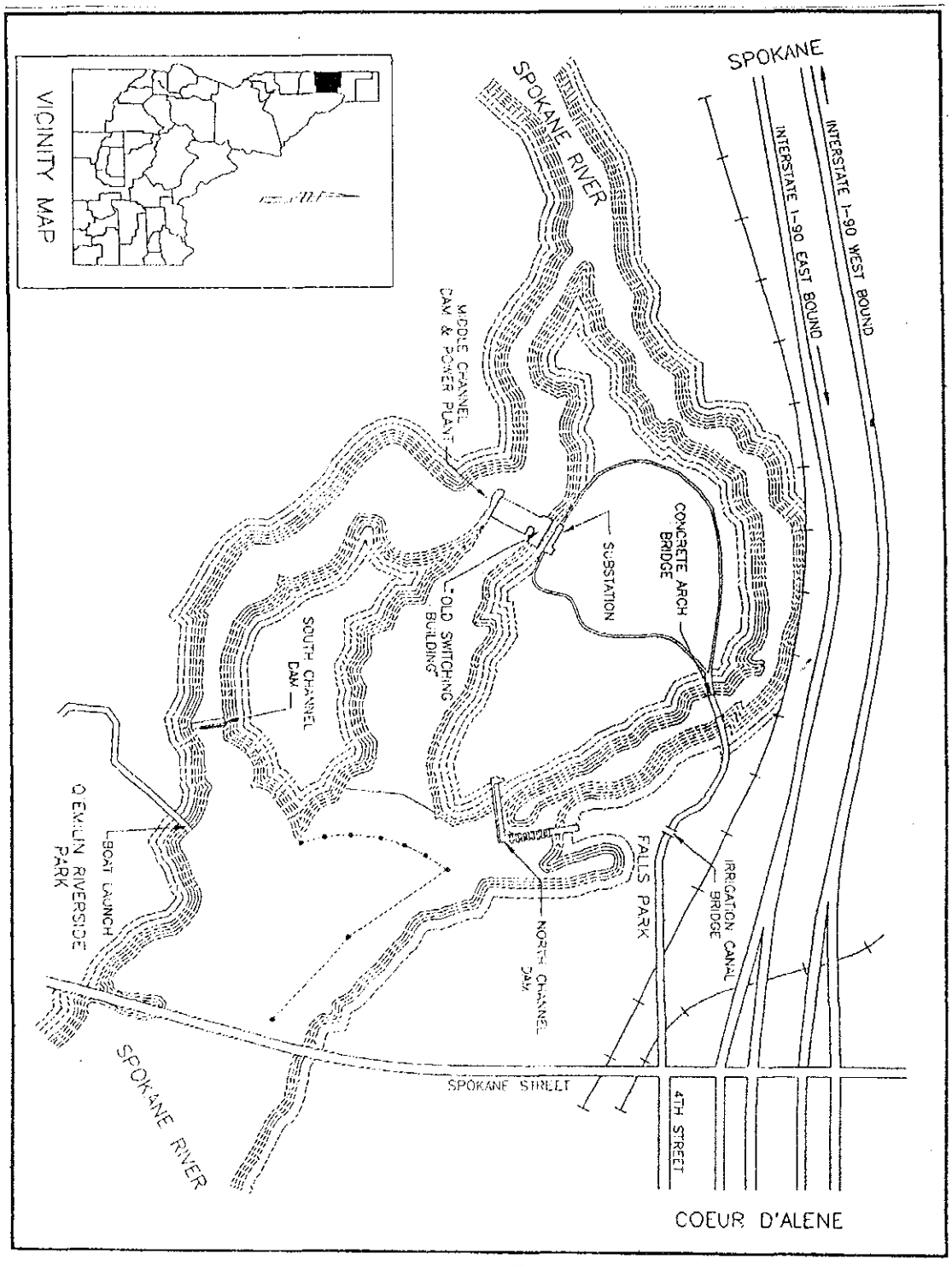

Figure 1, "Sketch Plan of the Post Falls Power Plant"

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XIII. PROJECT INFORMATION

This documentation has been prepared at the request of the WWP, which is planning to replace the original trash rake lifting mechanism with a new and larger lifting device. This project could entail removal of a portion of, or perhaps, the entire original shed roof that covers the trash rake gate lifting mechanism and intake gate mechanisms at the Post Falls Power Plant, which is located on the Middle Channel island on the Spokane River. The WWP has volunteered to participate in full HAER recordation of the significant structures and components that comprise the Post Falls Power Plant. The HAER recordation effort is not a part of Federal review requested under Section 106 of the National Historic Preservation Act of 1966, as amended.

The WWP proceeded with HAER recordation of the Post Falls Power Plant because of their commitment in balancing the interests of the company's functioning historic property, while initiating necessary upgrades that will ensure that the historic property will retain its original function, and, at the same time allow the facility to be competitive in the rapidly changing needs of the hydroelectric industry and of the demands of the customers it serves.

Project Manager and Principal Investigator for the recordation was Robin Bruce of Western Historical Services, Post Falls, Idaho. Mr. Pete Rice of Colfax, Washington, provided photographic documentation for the project. Mr. Rik VanGelder of Post Falls, Idaho, drafted the sketch plan of the Post Falls Power Plant.

Documentation provided in the recordation resulted principally from Ms. Bruce's research in various archives of the WWP, other pertinent repositories and sources, field inspection of the historic property, and interviews with knowledgeable informants.